



MINISTRY OF DEFENSE

PROFESSOR TSVETAN LAZAROV DEFENCE INSTITUTE

Sofia 1592, 2 Prof. Tsvetan Lazarov Blvd., fax: 02/92 21 808, <http://di.mod.bg>

Per. № 3-4097/18.06.2025r.

REVIEW

by Prof. Georgi Stavrev Sotirov, PhD,

Space Research and Technologies Institute – Bulgarian Academy of
Sciences

1113 Sofia, ul. Acad. G. Bonchev, bl. 1., Tel. 0878 705 425

of the scientific papers submitted in the competition for the academic position of “associate professor” for a military serviceman according to the order of the Minister of Defense No. OH-293/25.03.2025 as announced in the State Gazette No. 29/04.04.2025 competition in the field of higher education 5. "Technical Sciences", professional direction 5.3. "Communication and Computer Engineering", scientific specialty "Radio Transmitting and Radio Receiving Equipment" for the needs of the "Communication Networks and Systems" Department at the "Prof. Tsvetan Lazarov" Defense Institute.

with candidate: Col. Dr. Eng. Ivan Penchev Ivanov,
Director of the Directorate at the "Prof. Tsvetan Lazarov" Defense
Institute.

1. General description of the submitted materials.

In the competition for "Associate Professor" in the "Communication Networks and Systems" Department of the "Prof. Tsvetan Lazarov" Defense Institute announced in the State Gazette No. 29 of 04.04.2025, one candidate participated - Col. Dr. Eng. Ivan Penchev Ivanov.

The materials submitted by the candidate for participation in the competition include: a creative autobiography; a summarized list of scientific works, a list and copies of scientific publications for participation in the competition, a bibliographic reference of his citations; scientific-organizational and expert activity and an author's reference for fulfilling the scientometric indicators of the Institute "Prof. Lazarov" for the academic position "Associate Professor".

The complete list of the candidate's list of works includes 39 publications (articles and scientific reports) in our and international publications, of which 34 are in Cyrillic, 5 in Latin, 15 of which are independent.

The submitted list of works for the competition for the academic title "Associate Professor" includes 24, which the reviewer accepts for review.

The works submitted for review can be distributed as follows:

- monographs - 1 piece. [II.1.1] ;
- publications in foreign publications - 1 issue [II.2.28]
- reports in proceedings of international scientific conferences in Bulgaria - 19 issues [II.2.2-2.6, II.2.8-2.19, II.2.22, II.2.31];
- reports in proceedings of national scientific conferences, sessions and seminars - 3 issues [II.2.20-2.21, II.2.23];
- publications in journals and series - 1 issue [II.2.1];

The reviewer takes into account the scientific and applied achievements of the candidate related to his participation in 2 international scientific research projects [II.3.1-3.2], but does not review them due to the fact that they have not been published.

The list of citations includes a total of 38 citations of his scientific works, including 12 citations by foreign scientists in prestigious databases, as well as in abstract publications.

The data on the research and implementation activities of Dr. Ivanov show great activity related to publications and participation in scientific events and forums, as a researcher, implementer and expert in the scientific specialty of the competition.

The review of the documents of Col. Dr. Ivanov shows that the procedural and legal requirements arising from the Law on the Development of the Academic Staff of the Republic of Bulgaria (Art. 24, para. 2, 3 and 5), the Regulations thereto (Art. 53) and the Regulations on the terms and conditions for holding academic positions at the Institute of Defense have been met. The candidate has fulfilled the scientometric indicators for "associate professor" - 703 points with a required minimum of 400 points, according to the cited Regulations of the Institute of Defense "Prof. Tsvetan Lazarov".

2. General characteristics of the candidate's scientific research, applied science and pedagogical activities

The candidate's scientific, applied science and expert activities can be grouped into the following areas - research in the field of communication and information technologies for the needs of defense, with a focus on the design and construction of radio communication systems for maintaining the command and control process and the exchange of information in weapons control systems.

A special place in the scientific research and implementation activities of Dr. Ivanov in recent years has been occupied by multifunctional radio engineering systems based on software-defined radio platforms, with the possibility of use for communication, radar, navigation and electronic warfare.

A characteristic positive feature of the candidate's scientific achievements is that they are directly related to the further development of

known approaches, methods of existing algorithms, methods and methodologies for synthesis and analysis of communication and information technologies, in which specific scientific and scientific-applied tasks are solved, related to direct support of the processes of modernization of the communication and information environment for work in BA.

In general, from the general characteristics of the candidate it can be noted that he is a successful scientist, researcher, developer of modern radio engineering and communication systems, manager and expert. The materials presented in the competition demonstrate his ability to solve practically useful scientific problems, choosing appropriate approaches, methods, algorithms and methodologies in the field of improving communication and information means in order to increase the efficiency of their implementation and improve their use.

The candidate's scientific interests are strongly influenced by the problems solved in the process of operating communication means and systems. This is based on the fact that a large part of the published articles and reports are based on implemented experiments and research on cognitive radio stations and radio engineering systems, communication and information systems and technologies, and software-defined active and passive radar systems.

Therefore, from everything said so far, from the quality of the submitted works, his participation in projects, as well as the number of published works and their publicity, the impression is built that the candidate is a successful researcher, scientist and expert in the field of the announced competition.

3 Assessment of the candidate's special training and activities

The candidate graduated from the Military University "V. Levski", Veliko Tarnovo, in 1993, majoring in "Signal Troops - Radio and Radio Relay Communication Equipment". In 2004, he obtained the educational and scientific degree "Doctor" in the scientific specialty 02.07.04 "Radio Transmission and Radio Reception Equipment" at the Institute of Radio and

Television Engineering, Military Academy "G. S. Rakovski". Since 1993, he has worked in the military, scientific and military-scientific field in various military formations and scientific institutes, as well as specialized units for the development of communication systems and technologies for the needs of defense. He held the following positions: Research Associate at the Military Scientific and Technical Institute, Assistant Head of Department at the General Designer's Office of the KAS, Head of the Communication Networks and Systems Department at the Defense Institute, Director of the C4I Systems Development Directorate. He was a national representative in the System Concepts and Integration Panel of the NATO Science and Technology Organization during the period 2012-2023.

Dr. Ivanov is the author of the monograph "Software-Defined Radio Communication Systems" ISBN: 978-619-90024-8-3. The content of the monograph is very relevant and is directly related to modern concepts and practical activities in the use of software-defined radio communication systems and means in the interests of the country's defense and security.

The candidate is the author of over 20 educational and methodological works - research, descriptions, work projects, methodologies, etc., related to the topic of the competition.

4. Main scientific results and contributions

From the analysis of the 24 scientific papers submitted for the competition and from the documents of the only candidate in the competition, it is evident that Doctor Ivanov is a promising scientist and researcher who has focused his efforts in the following scientific areas: communication and information technologies for the needs of defense, radio engineering systems based on software-defined radio platforms, with the possibility of use for communication, radar, navigation and electronic warfare.

In the monographic work "Software-defined radio communication systems", DI "Professor Tsvetan Lazarov", 2025, ISBN 978-619-90024-8-3 [II.1.1], based on the functional block diagram of a radio communication

system, the blocks are analyzed, modeled and simulated using the SDR concept, with the main scientific and scientific-applied contributions in it being related to:

- Synthesis of a complete model, in the GNU Radio environment, of a software-defined radio communication system with QPSK modulation;
- Through numerous implementations of basic communication protocols using SDR, the advantages of the technology in quickly moving from model to prototype have been practically established.

The candidate's contributions outside the habilitation work relate to research in the following areas: architectures, modeling, design and prototyping of software-defined, cognitive radio stations and radio engineering systems; analyses, architectures, prototyping of communication and information systems and technologies; perspectives, architectures and improvement of software-defined active and passive radar systems.

I note the most important scientific and applied achievements of the candidate in solving these tasks:

The paradigms for a software-defined radio station (SDR) and a cognitive radio station have been analyzed and the ideas about their essence and content have been enriched [II.1.1, II.2.2]. Improved architectures for their implementation are proposed, using cognitive machines [II.2.2], cloud technologies [II.2.11, II.2.17, II.2.19], polyphase filtration/synthesis [II.2.18] and a controllable communication environment [II.2.21]

- The promising technologies for building radar systems are analyzed [II.2.15] and the role of software-defined radio platforms in the development of future promising radars is assessed [II.2.9].

5. Assessment of the significance of contributions to science and practice

The candidate's most important scientific and applied achievements are in the class of enrichment of existing knowledge: such as creating new research methods, new constructions, technologies, obtaining and proving new

facts, obtaining confirmatory facts, when solving these tasks I note: - the promising technologies for communication and information systems and their practical application for security and defense purposes have been analyzed [II.2.3, II.2.6, II.2.8]; - an information and digital model of data structures with a role for objective control has been proposed, as well as an algorithm for generating an information frame of data when registering flight information of aircraft [II.2.13]. As scientific and applied contributions in the class of application of scientific achievements in practice, related to the implementation of modern information technologies, I consider the following as important:

- a multifunctional radio-technical system for communication and electronic warfare, based on SDR, has been created and experimented [II.2.23];

- the results of the specific use of modern military technological solutions for building a departmental cellular system according to the TETRA standard and its future development [II.2.1].

- the possibilities for monitoring and security of the dual-band architecture using a software-defined platform USRP have been studied [II.2.16 II.2.20].

There are 38 known citations of the candidate's publications of his scientific works, including 12 citations by foreign scientists in prestigious databases, as well as in abstract publications, according to the submitted reference to the works of the competition.

6. Assessment of the extent to which the contributions are the work of the candidate

24 publications and reports and one monograph were submitted for the competition. 12 publications are independent, and the rest are co-authored. In the publications in co-authorship, the candidate is in first place in 4, in the remaining 8 he is in second and subsequent places. The reviewer assumes that

the candidate's contributions are equivalent in all publications. The submitted materials and my personal observations confirm that the candidate has his own place or handwriting in the joint publications.

7. Critical notes on the reviewed works

The reviewer has the following critical notes on the materials submitted for the competition:

- the submitted list of publications of the candidate is incomplete.

I recommend that the candidate participate in more domestic and international projects in the future, if possible, in order to popularize his scientific and applied activities.

The indicated critical note and recommendation do not concern the main scientific and scientific-applied contributions of the submitted works and do not in any way belittle the merits of the candidate's scientific production

8. Personal impressions and other issues on which the reviewer believes he should take a position

My acquaintance with Col. Dr. Ivan Ivanov dates back to our joint service at the MRTI, as a reviewer of his monograph "Software-Defined Radiocommunication Systems" and the invitation extended by the Scientific Council of the Institute "Prof. Tsv. Lazarov" to participate in the Scientific Jury for the competition. From the prepared monograph and the materials submitted by the candidate for participation in the competition, I got the impression that he is a well-prepared, responsible scientist, researcher and expert with a serious presence in the institute's board, working in the field of radio transmitting and receiving equipment.

I note that the candidate in the competition has no proven plagiarism in scientific works in accordance with the legally established procedure (Article 24, paragraph 5 of the Law on the Development of the Academic Staff of the Republic of Bulgaria.

I have no joint publications with Col. Dr. Ivanov and I am not a person related to him within the meaning of paragraph 1, item 5 of the Additional

Provisions of the Law on the Development of the Academic Staff of the Republic of Bulgaria.

9. Conclusion

One candidate, Colonel Dr. Ivan Penchev Ivanov, Director of the Directorate at the Institute of Electrical Engineering "Prof. Tsv. Lazarov", participated in the competition for the academic position of "Associate Professor". Taking into account the scientific production and scientific contributions of the candidate, the significance of the scientific and applied developments and the response in the scientific community, I believe that the same fully meets the requirements for occupying the announced academic position.

The presented facts from the materials of the competition give us reason to recommend to the Scientific Jury to propose to the Scientific Council of the Institute of Electrical Engineering "Prof. Tsv. Lazarov" to award the academic position of "Associate Professor" to Dr. IVAN PENCHEV IVANOV in the field of higher education 5. Technical Sciences, professional field 5.3 "Communication and Computer Engineering", scientific specialty "Radio Transmission and Radio Reception Equipment".

Sofia

17.06.2025

Reviewer: ..

Prof. Dr. Eng.  Georgi Sotirov